

REPORT OF THE AD HOC ADVISORY COMMITTEE
TO THE SSC DIRECTOR AND SIRTf PROJECT SCIENTIST
ON THE SIRTf RESPONSE TO THE WIRE FAILURE

On 29 and 30 April 1999 this committee was convened at IPAC by SIRTf Science Center Director Tom Soifer and Project Scientist Mike Werner to advise them on the appropriateness of making modifications to the current SIRTf science program as a result of the loss of the IR sources that were anticipated to come out of the WIRE surveys at 12 and 25 microns.

The specific charge given to the committee was to evaluate the impact of the loss of the core WIRE high galactic latitude survey on SIRTf science programs and to advise whether and how SIRTf and the SSC should undertake actions to redress this situation so as to maximize the scientific return from SIRTf.

The committee was given briefings by SSC, SIRTf Project, and WIRE personnel on the characteristics and planned science programs of WIRE and SIRTf, and the responsibilities and capabilities of the SSC and the SIRTf instrument teams. Based upon the information presented to us, we have come to the following conclusions:

1. The science program of the WIRE mission was very important, and would have made an essential contribution to characterization of the IR sky at 12 and 25 microns. Its sources would likely have been important target objects for many of the programs to be carried out on SIRTf.
2. Although SIRTf cannot duplicate the WIRE observing program, it does have imaging capabilities at wavelengths which would produce a representative sample of previously undetected sources in a modest amount of observing time.
3. The Legacy Science Program represents an excellent process by which to produce outstanding science on SIRTf, provide early illustration of SIRTf's capabilities to address a wide range of problems, and provide early community access to a database that will aid significantly in planning GO programs. These peer-reviewed projects should remain the pillars of the early scientific program of SIRTf.
4. The addition of a representative view of the mid-IR sky at a level equivalent to that which WIRE would have provided represents a critical augmentation of known IR sources to serve as targets for the detailed studies that SIRTf will conduct. Given the estimated 5-year lifetime of SIRTf, it is essential that this sample be acquired as soon as possible so the broad community can optimize planning for early observing cycles.
5. The loss of the expected WIRE source catalogs which would have provided target lists for many types of SIRTf science makes it imperative for the scientific success of SIRTf that a more fully capable pipeline data processing system be in place at the SSC at the time of launch. The currently planned pipeline would only produce calibrated, individual images. The steps needed to identify and remove low-level cosmic rays, to

register overlapping images and to merge the images in a dither-set or map together were all to be left to the user, as was the source extraction optimized for final SIRTf images. The lack of these latter capabilities will cause individual users to expend substantial, duplicative efforts developing software of their own and will delay the release of initial datasets, both of which will cause wasted effort. It is our belief that the current level of effort is unlikely to provide for acceptable, immediately scientifically usable data products when they will be needed, and this situation needs to be addressed.

The committee discussed at some length the overarching topic of the scientific impact of SIRTf during our two-day meeting, especially in the context of the loss of the WIRE satellite and its primary science. We remain excited about the tremendous scientific potential that SIRTf holds. Achieving that potential will, however, require both additional effort and funds. In particular, we believe it is vital that the science observations on SIRTf be initiated with a brief survey that will provide for a representative sample of sources for subsequent study. In addition, we also believe the data processing pipeline at the SSC needs to be upgraded to provide for a more rapid analysis of SIRTf imaging results. We believe that both of these matters can be addressed straightforwardly, and therefore we recommend to the SSC Director and SIRTf Project Scientist the following actions.

RECOMMENDATIONS:

In response to the loss of WIRE and its effect on the SIRTf science program, the Committee recommends that a special survey -- of order 100 hours duration - be carried out by SIRTf as its first observing program in order to characterize the mid-IR sky to sensitivity levels two orders of magnitude fainter than presently known. The wavelength coverage of MIPS makes it the obvious instrument of choice to carry out this survey. Although not replacing the WIRE survey, this program should yield a quick-look, representative sample of ~1000 sources at 24 microns that are essential for the planning of a wide range of SIRTf GO and Legacy Science projects.

The SSC should take lead responsibility for planning and executing the survey and for making survey data products available to the community so this information can be used in the preparation of GO proposals for Cycle 2. In doing so, we strongly urge the SSC to seek involvement of the broad community of potential SIRTf users and to ensure that the community is represented in the definition of the survey.

Supporting this survey and releasing survey products to the community immediately after their validation will require that the SSC develop a full complement of software tools, including mosaicing, cosmic ray rejection, and frame co-addition. These same tools are also critically needed to ensure the early release of data arising from Legacy Science projects which also contain essential information for planning Cycle 2 GO programs. To accomplish this will require application of additional pre-launch resources of order ~\$4M as soon as possible. The benefits to the community and the Legacy Science databases, and the enhanced software toolbox that would emerge from early implementation of a shallow mid-IR survey are large, and lead us to suggest that some of the enabling funding may come from the (post-launch) GO and Legacy Science data analysis funding pool.

The committee believes that the ultimate responsibility for guaranteeing the adequacy of SIRTF data reduction software resides with the SSC, and in this role, we encourage them to avail themselves of relevant expertise and software that exists in the community.

The prompt identification of survey fields is critical to planning Legacy Science projects and GO programs and crucial complementary ground-based programs. We therefore urge the SSC to work with the community to fully characterize the survey and identify the target fields prior to autumn 1999.

Submitted by

R. Williams (Chair), N. Bahcall, C. Beichman, P. Hacking, B. Jannuzi, J. Stauffer, S. Strom, D. Weedman
20 May 1999